



AEROSPACE MATERIAL SPECIFICATION

AMS3699™**REV. A**

Issued 1983-07
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Reaffirmed 2022-12

Superseding AMS3699

Resin System, Epoxy, Carbon Microballoon Filled
135 °C (275 °F) Cure

RATIONALE

AMS3699A has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE:

- 1.1 Form: This specification covers a two-part epoxy resin system in the form of a bisphenol "A" epoxy resin filled with fumed silica and carbon microspheres and a separate curing agent.
- 1.2 Application: Primarily for filament wound pressure vessels where potting or casting is required.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2825 - Material Safety Data Sheets
AMS 3753 - Microspheres; Carbon, Hollow
AMS 3755 - Powder, Fumed Silicon Dioxide

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<https://www.sae.org/standards/content/AMS3699A/>

Documents
Document Sharing Hub

- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D648 - Deflection Temperature of Plastics under Flexural Load
ASTM D651 - Tensile Strength of Molded Electrical Insulation Materials
ASTM D695 - Compressive Properties of Rigid Plastics
ASTM D792 - Specific Gravity and Density of Plastics by Displacement
ASTM D1217 - Density and Relative Density (Specific Gravity) of Liquids
by Bingham Pycnometer
ASTM D1763 - Epoxy Resins
ASTM D2083 - Calculation of Percent Primary, Secondary, and Tertiary Amines
in Fatty Amines
ASTM D2393 - Viscosity of Epoxy Resins and Related Components
ASTM D2471 - Gel Time and Peak Exothermic Temperature of Reacting Thermo-
setting Resins

- 2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

- 3.1 Material: Shall be an epoxy resin system filled with hollow carbon microspheres and fumed silicon dioxide to be cured with an aromatic diamine curing agent.

- 3.1.1 Resin: Shall be an unmodified bisphenol "A" type epoxy resin meeting the requirements of 3.2.1.

- 3.1.2 Carbon Microspheres: Shall conform to AMS 3753.

- 3.1.3 Fumed Silica: Shall conform to AMS 3755/2.

- 3.1.4 Curing Agent: Shall consist primarily of an aromatic diamine meeting the requirements of 3.2.2.

- 3.2 Properties: The components and the resin system shall conform to the following requirements:

- 3.2.1 Epoxy Resin: Shall be in accordance with ASTM D1763, Type I, Grade 1, Class 1, except that the viscosity shall not exceed 10,000 centipoises (10 Pa•s).

- 3.2.2 Curing Agent: Shall be as follows:

- 3.2.2.1 Specific Gravity 1.10 - 1.14 ASTM D1217

3.2.2.2	Viscosity	25,000 - 150,000 cp (25 - 150 Pa•s)	4.5.2.1
3.2.2.3	Amine Equivalent	50 - 55	ASTM D2083
3.2.3	<u>Uncured Resin System:</u> Shall be as follows when mixed in the following proportions by weight: epoxy resin, 100; curing agent, 31; fumed silica, 4; carbon microballoon, 40.		
3.2.3.1	Viscosity, cp (Pa•s)	Preproduction value, $\pm 10\%$	4.5.2.1
3.2.3.2	Gel Time, min.	Preproduction value, $\pm 10\%$	ASTM D2471
3.2.4	<u>Cured Resin System:</u> Shall be as follows when cured by the following cycle: 4 hr ± 0.2 at 65°C ± 5 (150°F ± 9), 4 hr ± 0.2 at 105°C ± 5 (225°F ± 9), 4 hr ± 0.2 at 135°C ± 5 (275°F ± 9). Tests shall be performed on specimens molded as in 4.5.3 and in accordance with specified test methods.		
3.2.4.1	Specific Gravity	Preproduction value, $\pm 2\%$	ASTM D792
3.2.4.2	Tensile Strength, psi (MPa)	Not less than 90% of preproduction value	ASTM D651
3.2.4.3	Heat Distortion Temperature, °C (°F)	TBR (1)	4.5.3.1
3.2.4.4	Compressive Strength, psi (MPa)	TBR	ASTM D695

(1) TBR - To be reported on preproduction test report.

3.3 Quality: The resin system, as received by purchaser, shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from imperfections detrimental to usage of the resin system.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the resin system shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the resin system conforms to the requirements of this specification.

4.2 Classification of Tests: